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(54) In-mold Labeler.

(57) This relates to a label applicator (14) for applying labels (L) to mold cavities (12) of rotating mold units. The label applicator (14) is fixed relative to moving mold units and includes an extensible fluid motor (60) which carries a pick-up head or suction head (70) for moving the suction head in a straight line direction and return. The extensible fluid motor (60) is carried by a shaft (36) for oscillation between a label pick-up position and a label deposit position. The extensible fluid motor (60) is carried by a bracket (52) which, in turn, is carried by a shaft (28) of a rotary drive which is constructed to oscillate between two fixed positions which are spaced apart a preselected angular distance. The rotary drive may be a rotary actuator (18) or an extensible fluid motor. There is incorporated with the rotary actuator (18) a decelerator (32) for rapidly, yet smoothly, decelerating rotation of the bracket (52) carrying the extensible fluid motor (60). Suitable sensor means (M,H) are provided for timing the actuation of the label applicator (14) in accordance with the position of a mold cavity into which a label (L) is to be placed. This abstract forms no part of the specification of this application and is not to be construed as limiting the claims of the application.

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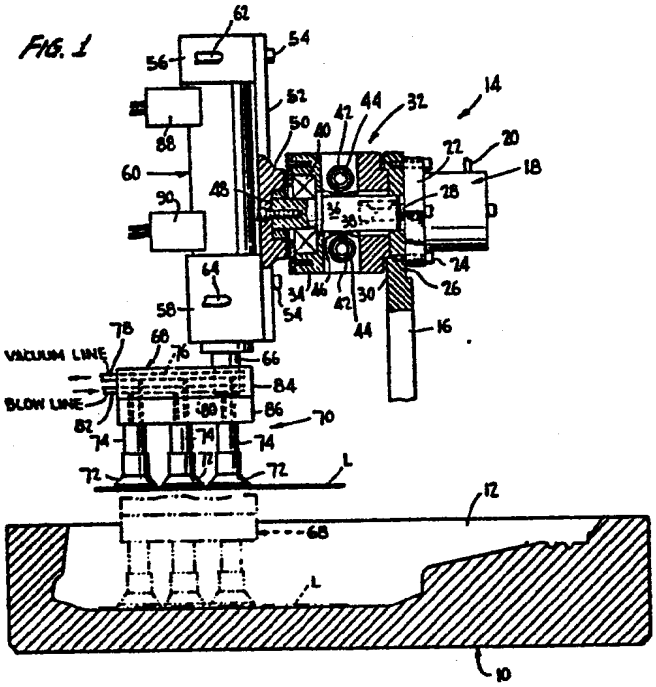
FIG. 1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Title: IN-MOLD LABELER

This invention relates in general to new and useful improvements in applying labels into mold halves of blow molding machines wherein, prior to the blow molding of a preform in a closed mold formed of two mold halves, a label is placed in one or both mold halves. Most particularly, this invention relates to a label applying device of the type basically disclosed, but materially different from, those illustrated and described in U.S. patent Nos. 4,355,967 and 4,359,314, granted to Ernest W. Hellmer on October 26, 1982 and November 16, 1982, respectively.

This invention relates particularly to the application of a label or labels into mold halves of molds which move in a generally circular path and which open and close in a radial direction and wherein, after each mold unit has opened and the previously molded article is removed therefrom, a label or labels is or are applied to one or both mold halves by a mechanism which may be positioned between the open mold halves. The mechanism will pick up a label from a horizontally disposed label stack, rotate the label on the order of 90° into alignment with the open mold half and then, in properly timed relation with the movement of the mold half, apply the label thereto.

One form of this invention particularly relates to a label applicator which includes a rotary actuator constructed to oscillate between two terminal positions through a preselected arc on the order of 90°, the actuator having a shaft which is coupled to a mounting bracket for

an extensible fluid motor which, in turn, carries a suction head for picking up, carrying and discharging the labels.

There may be interposed between the rotary actuator and the mounting bracket a decelerator which will permit rapid movement of the rotary actuator but will dampen the stopping thereof in a manner so as not to apply an undesirable impact force on a label which would release the label from the carrier therefor.

In accordance with another form of this invention, it has been found that an air cylinder having a 3/4 inch bore will provide sufficient force at 100 p.s.i. to effect the desired oscillation of the shaft and the label pick-up mechanism carried thereby. This small bore air cylinder having a three inch stroke, when coupled to the shaft by a lever arm providing the necessary force multiplication factor, has provided the adequate drive while occupying much less than the identified three inches previously required space so as to permit the mounting of two such air motors in side-by-side relation.

With the above and other objects in view that will hereinafter appear, the nature of the invention will be more clearly understood by reference to the following detailed description, the appended claims, and the several views illustrated in the accompanying drawings.

IN THE DRAWINGS:

Figure 1 is an elevational view with parts broken away and shown in section of the label applicator in position awaiting a mold half to become aligned therewith.

Figure 2 is a transverse sectional view taken through the mold half from the left in Figure 1, showing the label applicator in elevation and showing in phantom lines the label applicator in position for picking up labels.

Figures 3A-3G are schematic views showing the general operation of the label applicator.

Figure 4 is a flow diagram showing the various actuations of components of the label applicator and a molding machine.

Figure 5 is a schematic elevational view with parts out of phase showing the manner in which two label magazines and two label transfer units using extensible fluid motors may be mounted for applying labels to radially inner and outer halves of a radially split blow mold.

Figure 6 is an elevational view of the label transfer apparatus as viewed from the right of Figure 5, with parts broken away and the outer mold half shown in transverse section.

Figure 7 is a side elevational view, taken generally along the line 7-7 of Figure 5, of the mounting of the label transfer apparatus utilizing the air cylinder.

Figure 8 is a sectional view, taken generally along the line 8-8 of Figure 7, showing the specific details of the modified label transfer apparatus.

Figure 9 is an enlarged fragmentary sectional view taken substantially along the line 9-9 of Figure 7, and shows further the details of the label transfer apparatus.

As set forth above, this invention relates to a label applicator which is particularly constructed for applying in an open blow mold half cavity a label. It is to be understood that each blow mold half is one-half of a blow mold unit which rotates in a generally circular path and which closes on a preform and, as the closed mold unit rotates, the preform therewithin is blow molded to the configuration of the mold unit cavity and at the same time incorporates therein on the outer surface thereof a label which was previously placed within the blow mold cavity. In a preselected part of the rotational path of the blow mold unit, after the article has been blow molded therein and has cooled sufficiently for removal

from the blow mold unit, the two halves of the blow mold unit separate in a radial direction and the blow molded article is discharged therefrom. At this time the blow mold halves are sufficiently radially spaced to pass radially inwardly and radially outwardly of a label applicator. This invention particularly relates to the label applicator and the label applicator has been illustrated in position relative to the inner mold half only of a twin cavity mold half.

Referring now to Figure 1, it will be seen that a typical radially inner mold half is generally identified by the numeral 10, the mold half 10 being only schematically illustrated and being provided with twin cavities 12 (Figure 2).

The label applicator, which is generally identified by the numeral 14, includes a plate-like mounting bracket 16 which is fixedly secured to frame portions (not shown) of a blow molding machine. The label applicator 14 includes a rotary actuator 18 which is of the fluid driven type and is provided with suitable fluid lines 20 which lead to flow control valves (not shown) which do not in and of themselves form part of the invention.

The rotary actuator 18 includes a mounting flange 22 which is secured by means of fasteners 24 to one face 26 of the mounting plate 16. The rotary actuator 18 is provided with an output shaft 28 which, in accordance with the construction of the rotary actuator, oscillates through a predetermined arc between first and second stationary positions whereat the shaft 28 is held by fluid pressure. In accordance with this invention, the rotary actuator 18 rotates through an arc on the order of 90°. The position of the label actuator 18 is sensed by a sensor H mounted on the mounting plate 16 when the label applicator 14 is rotated to the label pick-up position and by a sensor M mounted on the mounting plate 16 when

the label applicator 14 is rotated to the label place position, as will be discussed in more detail hereinafter.

In order to facilitate rapid deceleration of the rotation of the output shaft 28, there is mounted on the opposite face 30 of the mounting plate 16 a decelerator generally identified by the numeral 32. The decelerator 32 includes a housing 34 which is secured to the mounting plate 16 by way of other fasteners (not shown). The decelerator 32 includes a shaft 36 which has one end thereof, in the illustrated embodiment of the decelerator 32, telescoped over the output shaft 28 and locked thereto by means of a key and key slot arrangement 38.

The opposite end of the shaft 36 is mounted within a bearing 40 carried by the housing 34 and for rotation with respect to the housing 34.

The central portion of the decelerator 32 includes two decelerator units 42 which may be of the spring or fluid type. The two decelerator units 42 have active faces 44 facing in the same direction. The central portion of the shaft 36 is provided with a double faced stop member or flag 46 which is fixedly attached to the shaft 36. In one direction of rotation of the shaft 36, the stop member 46 will have one face thereof engage the operative face 44 of one decelerator unit 42 to slow the rotation of the shaft 36 as it approaches one of its fixed positions. The other face of the stop member 46 will be in angularly spaced relation with respect to the one face such that when the shaft 36 approaches the other of its two positions, the other face of the stop member 46 will engage the operative face 44 of the respective decelerator unit 42 to slow the rotation of the shaft 36 as it approaches its other fixed position.

As will be described hereinafter, a label to be transferred to a blow mold half cavity will be carried by a suction head, and the purpose of the decelerator unit 32 is to permit rapid rotation of the label applicator

while slowing the stopping of the label applicator at a controlled rate such that the label carried by the suction head will not be displaced relative thereto.

The shaft 36 has a free end 48 which extends from the housing 34 and which has mounted thereon a hub 50 of a mounting bracket 52. The mounting bracket 52 includes a mounting plate to which there is secured by fasteners 54 end caps 56, 58 of a conventional extensible fluid motor 60. The fluid motor 60 is provided with fluid lines 62, 64 which will be connected to conventional valving (not shown). The fluid motor 60 is provided with a cylinder rod or piston rod 66 which, in turn, carries a support head 68. The support head 68, in turn, carries a suction head 70 which, in the illustrated embodiment of the invention, includes three suction cups 72 each connected to the support head 68 by suction cup stems 74.

At this time it is pointed out that when the blow mold half 10 is of the twin cavity type, as shown in Figure 2, the support 68 will carry twin suction heads 70.

It is to be understood that the support head 68 will be provided with a vacuum manifold 76 to which there is coupled a vacuum line 78 and a blow air manifold 80 to which there is connected a blow line 82.

It is also to be noted that the support head 68 is formed of two parts 84, 86 which are coupled together with breakaway coupling means (not shown) which will permit the support head to be of a breakaway type in the event of mistiming of the actuation of the label applicator 14 with respect to the position of a blow mold half such as the blow mold half 10.

The fluid motor 60 carries electrical sensors 88, 90 which will sense the position of the piston rod 66. Most specifically, the sensor 88 will sense the retraction of the piston rod 66 while the sensor 90 will sense the

extension of the piston rod 66. These sensors, in turn, control actuation of other components of the label applicator as will be described in more detail hereinafter.

Referring now to Figure 2, it will be seen that when the mold half 10 is of the twin cavity type, there will be two horizontal stacks of labels L, one stack for each of the two cavities 12. Each stack of labels L will be mounted within a suitable stack unit 92 and each stack of labels will be urged to the right, as shown in Figure 2, by spring means (not shown) so that there will always be a label L at the front fact of each stack unit.

The timing sequence of the operation of the label applicator 14 is shown in Figure 4. It is to be understood that associated with each mold unit are control targets which control the operation of the label applicator. A first of these control units is an ITD control in the form of a timer which controls the retraction of the extensible fluid motor 60 at the label stack or magazine.

The second illustrated control is a sensor H which is located at the magazine and which senses when the label applicator 14 has been rotated to the label pick-up position. Only when the sensor H has been actuated can the extensible fluid motor 60 be actuated at the magazine to pick up a label or labels to be applied.

The next identified control is the sensor M which is actuated when the label applicator 14 has been rotated to its label place position. Only during this time frame can the fluid motor 60 be actuated to place a label within an associated mold.

The next control, which is identified as OK TO LABEL control, is controlled by the position of the approaching mold and provides a relatively large time frame which starts at the same time as the beginning of the sensor M time frame, but terminates prior thereto.

The next control is a MOLD SAFETY - 8 sensor type control which more closely restricts the time frame

during which a label may be placed within a mold and has an end corresponding to the end of the time frame for the OK TO LABEL control.

Next, there is provided a labeler time TD3 which provides a very restricted time frame within which the fluid motor 60 may be extended to place a label within the mold.

Finally, there is a VACUUM/BLOW TIMER TD4 which controls the time during which blow air is directed to the suction head 70 to discharge a label from the suction head 70.

It is to be understood that the fluid motor 60 can be extended only when the label applicator 14 is in its proper rotated position relative to the magazine or in its proper rotated position with respect to the mold. It is also to be understood that the control of blow air to the suction head 70 is operable only when the sensor 90 senses the extended position of the piston rod 66 so that the blow air will not discharge a label until the label is within the mold and closely adjacent the surface thereof.

It will be seen that the timer TD4, when associated with the sensor 90, controls the operation of the blow air and that the blow air will be automatically shut off when the labeler retracts from the blow mold. It will also be seen that once the sensor 88 senses that the piston rod 66 has retracted, the rotary actuator 18 will be actuated to rotate the labeler back into alignment with the magazine and this condition will be detected by the sensor H.

It is to be understood that the MOLD SAFETY - 8 control or sensor will not permit actuation of the fluid motor 60 if the rotary actuator 18 has not rotated the labeler into alignment with the mold at a predetermined time in advance of the associated mold reaching a preselected position relative to the labeler. Thus, there is an absolute safety preventing the mold from striking the suction head 70.

The normal at rest position of the label applicator 14 is with the suction head 70 opposing but spaced from the respective stack of labels L, as shown in Figure 3A. When actuated, the label applicator 14 has the extensible fluid motor 60 actuated to extend the cylinder rod 66 so that the suction head 70 will engage and pick up the foremost label L from the stack of labels, as shown in Figure 3B. Since the label stack is horizontal, the engagement of the foremost label L by the suction cups 72 will result in only a slight rearward movement of the stack, and as soon as the suction head moves away from the label stack, as shown in Figure 3C, the remaining labels will again return to their forward positions and the picked up label L will be carried by the suction head 70. Once the extensible fluid motor 60 is fully retracted, as shown in Figure 3C, the rotary actuator 18 will become operative and will rotate the suction head 70 and the extensible fluid motor 60 through a preselected angle which, in the preferred embodiment of the invention, is 90° as shown in Figure 3D. The label L is now in position for insertion into the cavity 12 of the associated half 10.

It is to be understood that the label applicator 14 will remain in the position of Figure 3D until the associated mold half 10 reaches a prescribed position with respect to the label applicator 14 at which time the extensible fluid motor 60 will be actuated to move the suction head 70 into the related mold cavity to deposit the label L carried thereby in the mold cavity. At this time flow of the vacuum line 78 is cut off and flow to the blow line 82 is initiated so as firmly to force the label against the wall of the mold cavity 12 as shown in phantom lines in Figure 1. This condition is also shown in Figure 3E.

Immediately after the label has been deposited in the associated mold cavity, the extensible fluid motor 60 is actuated to retract the suction head 70 before the wall of the mold cavity can strike the suction head. Once

the suction head 70 has been fully retracted, the rotary actuator 18 is again rendered operative and it rotates the suction head 70 in the opposite direction, a clockwise direction as shown in Figure 3G, to the starting position of Figure 3A.

There are material advantages in having the label stack in a horizontal position. This permits, among other things, a much greater size stack which requires replacement of labels less frequently. It also eliminates jamming effects normally occurring in vertical label stacks.

The use of a rotary actuator permits the extremely quick alignment of the suction head first with the label stack and then with the mold cavity. The use of the decelerator unit permits the very rapid movement of the rotary actuator while minimizing the slowing down and stopping time under controlled conditions wherein a label will not be dislodged from or shifted relative to the suction head.

Although the label applicator 14 has been illustrated only in a position for applying a label to the radially inner mold half 10, it is to be understood that a like label applicator may be positioned circumferentially adjacent the illustrated label applicator for transferring other labels from another label stack in a radially outward direction to place such a label within a radially outer mold half.

It is also pointed out here that the mold halves will preferably be provided with suction means to retain placed labels in position therein.

Referring now to the air cylinder version, it will be seen that there is illustrated in Figure 5 certain of the molds of a Ferris wheel blow molding machine with the molds being restricted to those inner blow mold halves which appear between the 12:00 o'clock and the 3:00 o'clock positions and certain of the outer blow mold halves which

are associated therewith. The blow molding machine, which is conventional, includes a fixed set of radially inner blow mold halves 10 which are mounted for rotation in unison about a horizontal axis. Radially outer blow mold halves are identified by the numeral 114 and while they are mounted for rotation in unison with respective inner blow mold halves 10, they are mounted in a conventional manner for radially outward movement initially to permit the removal of a previously blow molded article therefrom.

It is to be understood that the mold halves 10, 114 reach their fully opened positions at generally the 12:00 o'clock position and the previously blow molded article is immediately ejected therefrom. The circumferential extent of movement of the outer blow mold halves 114 before they must return to their radially inner positions in association with the inner blow mold halves 10 is very restricted, as is shown in Figure 5.

In operation, there is provided a continuous tubular parison 116 which is ejected from a suitable extruder head (not shown) and the outer blow mold half 114 must move from its widely radially spaced position generally at the 1:00 o'clock position to a position clampingly engaging its associated inner mold half 10 at the 3:00 o'clock position wherein a section of the tubular parison 116 is clamped between the two cooperating blow mold halves 10, 114.

In Figure 5 there has been shown a first apparatus generally identified by the numeral 118, for delivering a label into the interior of each blow mold half 10. There has also been illustrated a second label delivery apparatus 120 for delivering a label into each of the radially outer blow mold halves 114. For purposes of illustration only, there has been shown the simultaneous application of a label L to a first outer blow mold half 114 and to an inner blow mold half 10 of a next following set of molds. In actuality, the timing will be such that a label

will be first placed in an inner blow mold half and then shortly thereafter into an associated outer blow mold half.

The two label applying apparatuses 118, 120 are basically of identical construction and vary only in the direction of rotation of a label from its associated magazine to an associated mold half. Accordingly, the basics of each label transfer apparatus will first be described without specific reference to Figure 5.

Referring now to Figure 9, it will be seen that there is illustrated a mounting plate 122 which is secured to an end portion of a support member 124. The details of the support member 124 will be described hereinafter. The mounting plate 122 is specifically constructed to receive an end of a housing 126 which is secured in place by screws 126 (Figure 7). The housing 126 is provided with bearings 130 in which there is journalled a short shaft 132. The shaft 132 is, however, of a length to pass out of opposite ends of the housing 126 and also of a length to pass through the mounting plate 122.

The shaft 132 at the end of the housing 126 remote from the mounting plate 122 carries a support fixture 134 for an extensible fluid motor 136. The extensible fluid motor is in fact a double acting air cylinder and has a projecting piston rod 138 which carries a mounting unit 140 for a plurality of suction cups 142. The mounting unit 140 and the suction cups or head 142 form a label pick-up and delivery head 144.

It is necessary that the shaft 132 be repeatedly oscillated through an arc on the order of 90° so that, as is best shown in Figure 6, the suction head 144 may be first presented to a label magazine 92 to pick up a label L and then rotated to a position aligned with a blow mold half 10 for presenting the label into the interior of the mold half.

A principal feature of this form of the invention is to provide drive means for the shaft 132 which will

effect the required oscillation thereof and yet will require a minimum of space in a circumferential direction with reference to Figure 5.

With particular reference to Figures 7 and 9, it has been found that the drive means which will perform satisfactorily and yet occupy a minimum of circumferential space will be a small elongated extensible fluid motor generally identified by the numeral 146. Most particularly, it has been found that an air cylinder identified as TOM THUMB MP1 will perform satisfactorily. This air cylinder has a 3/4 inch bore and a 3 inch stroke and is provided at each end thereof with an internal shock absorber to facilitate rapid but controlled deceleration at each end of the piston stroke. The air cylinder or fluid motor 146, at 100 p.s.i. air pressure, will provide 44 pounds push and 33 pounds pull as compared to the rotary air motors 23 inch/pound force.

With particular reference to Figure 7, it will be seen that the fluid motor 146 includes a cylinder 148 having mounted therein for reciprocation a piston 150 which carries a piston rod 152 which projects beyond the cylinder 148 at one end thereof. Also, as previously described, the cylinder 148 has at opposite ends thereof shock absorbers 154.

There is keyed and bolted onto that end of the shaft 132 which extends through the mounting plate 122 a fitting 156. The fitting 156 is in the form of a lever arm having a bifurcated end 158 and a mounting leg 160 which is secured to the shaft 132.

The piston rod 152 is provided with an eye type fitting 162 which is received in the bifurcated end 158 and is coupled thereto by a bolt or like member 164. Further, as is shown in Figure 7, the lever arm 156 will be beneficially mounted relative to the support unit 134 so that when the extensible fluid motor 136 is vertical the lever arm 156 will be offset from the vertical in a

counterclockwise direction 90°. With this positioning of the lever arm it will be seen that when the extensible fluid motor 136 opposes an associated label magazine 166 (Figure 8), the lever arm 156 will be in a position 45° in advance of the vertical in a clockwise direction. Thus, a maximum effective lever arm length is provided.

With particular reference to Figures 7 and 8, it will be seen that the mounting plate 132 overlaps and is secured by way of welding to an end portion of the generally horizontal support member 124. Further, it will be seen that the mounting plate 122 is slightly notched to provide clearance for one end of the fluid motor 146. Thus, the fluid motor 146 generally overlies the support member 124. The end of the cylinder 148 remote from the projecting piston rod 152 is provided with a bifurcated mounting fitting 168 which receives therebetween a mounting flange 170 carired by a fitting 172 which is suitably seated on and bolted to the support member 124 by means of a bolt.174. A pin or bolt 176 secures the flange 70 to the bifurcated fitting 168.

With reference to Figures 5 and 6, there is provided a mounting plate 178 which has an arcuate lower portion 180 of a size and shape to be adjustably bolted onto a frame member 182 of the blow molding machine. The plate 178 carries on the outer face thereof, i.e. facing away from the blow molding machine, a support plate 184 which is braced by a pair of braces 186, 188.

The support plate 184 extends radially. There is a further support plate 190 which also extends radially and is separated from the support plate 184 by an adjustable mounting unit 192 which permits axial and radial adjustment of the support plate 190 relative to the support plate 184. The support member 124 may be an integral part of the support plate 190.

It will thus be seen that the label transfer apparatus 18 may be directly mounted relative to the

support plate 190 on the left side thereof as viewed in Figure 5. On the other hand, to provide clearance the label transfer apparatus 120 is not only mounted to the right of the support plate 190, but is spaced therefrom utilizing an angular spacer 194 which is secured to the right face of the support plate 190, but is spaced therefrom utilizing an angular spacer 194 which is secured to the right face of the support plate 190 and, in turn, carries a separate support member 196 (Figure 6) on which a mounting plate similar to the mounting plate 222 may be secured or which may be so machined directly to receive the housing 126 of the label transfer apparatus 120 as shown in Figure 6.

The support plate 190 will carry mounting mechanisms 198 and 200 for the mounting of the label magazine 92 and a like label magazine 202 which is associated with the label transfer apparatus 120 and is best shown in Figure 6.

With reference to Figure 5, the extensible fluid cylinder 146 of the two label transfer apparatuses 118, 120 are disposed in parallel side-by-side relation although slightly radially and circumferentially offset and with a minimal clearance therebetween. This permits the label transfer apparatus 120 to be closely circumferentially adjacent the label transfer apparatus 118 for the proper timed positioning of labels in the outer mold halves 114 in cooperation with the timed positioning of labels in the inner mold halves 10.

Thus, by substituting the extensible fluid motor 146 for the rotary fluid motor 32, the space requirement has been greatly reduced in an unobvious manner, making it possible to mount the two label transfer apparatuses 118, 120 within a very restricted space, thus permitting the delivery of labels to both inner and outer mold halves of a Ferris wheel type molding machine even when those mold halves are of a relatively short length as would occur when a short bottle, such as a 16 ounce bottle, is being blow molded.

CLAIMS:

1. A label applicator for transferring a label from a generally horizontal label stack into a generally vertically opening mold, said label applicator comprising a horizontal shaft, support means mounting said shaft for rotation about its axis, a mounting bracket carried by said shaft for rotation therewith, an extensible fluid cylinder, said mounting bracket carrying said fluid cylinder with said fluid cylinder having an axis generally normal to the axis of said shaft, said fluid cylinder having a piston rod, a label pick-up head carried by said piston rod for selected projecting and retraction, and a motor for oscillating said shaft to first present said label pick-up head to a label stack to pick up a label and then by rotating said shaft to then present said label pick-up head to a mold half to position a label in said mold half.

2. A label applicator according to claim 1 wherein said motor is a rotary actuator of the type which rotates through a preset arc first in one direction and then in the other to assure automatic alignment of said label pick-up head first with a label stack and then with a blow mold half at a predetermined place.

3. A label applicator according to claim 1 or 2 together with decelerator means for controlling the rate of deceleration of said label pick-up head as it approaches each of its respective positions.

4. A label applicator according to claim 1, 2 or 3 wherein said support means includes a mounting bracket having two opposite faces, a support unit for said shaft secured to one of said mounting bracket faces, and said motor being secured to the other of said mounting bracket faces.

5. A label applicator according to claim 4 wherein said motor has a projecting drive shaft, a coupling between said shafts, and at least one of said shafts extending into said mounting bracket.

6. A label applicator according to any of claims 1 to 5 wherein said support means includes a mounting bracket having two opposite faces, a support unit for said shaft secured to one of said mounting bracket faces, and said motor being secured to the other of said mounting bracket faces.

7. A label applicator according to claim 3 or any of claims 4 to 6 when appendent to claim 3 wherein said decelerator means are carried by said support unit.

8. A label applicator according to claim 3 or any of claims 3 to 7 when appendent to claim 3 wherein said decelerator means includes a pair of decelerator units having operative faces facing in the same direction, and a double faced stop member carried by said shaft operable to have first one face thereof engage a respective one of said decelerator units and then the other face thereof engage the other respective decelerator unit.

9. A label applicator according to any of claims 1 to 8 together with sensor means for determining said label pick-up head being properly positioned for alignment with a label stack and with a mold path and for otherwise preventing extension of the fluid cylinder.

10. A label applicator according to any of claims 1 to 9 together with sensor means for sensing the retracted and extended position of said fluid cylinder, said means for sensing the extended position of said fluid cylinder forming means for controlling introduction of blow air to said label pick-up head when said label pick-up head is aligned with a mold, and said means for sensing the retracted position of said fluid cylinder forming means for preventing actuation of said motor except when said fluid cylinder is retracted.

11. A label applicator according to any of claims 1 to 10 wherein said mold is part of a Ferris wheel type blow molding machine having a frame, said support means including a support member having means for attachment to said frame, and said motor being a second extensible fluid motor, said second extensible fluid motor including a cylinder and a

piston carrying a piston rod, mounting means mounting an end of said cylinder remote from said piston rod to said support member, a lever arm on said shaft one end, and means connecting said piston rod to said lever arm.

12. Apparatus according to claim 11 wherein the diameter and stroke of said second extensible fluid motor taken in combination with the usable fluid pressure and the effective length of said lever arm provide the required force to oscillate said shaft while occupying a minimum of space circumferentially of said blow molding machine.

13. Apparatus according to claim 11 or 12 wherein there are two of said apparatus, one each for two mold halves of a single mold wherein said mold halves open in a radial direction and said mold halves include an inner mold half and an outer mold half, said apparatus being arranged in back-to-back relation with said drive means being in substantially interfering relation, and the permissible small cross section of said second extensible fluid motor forming clearance means.

14. Apparatus according to claim 13 wherein both of said apparatus are carried by said support member.

15. Apparatus according to claim 14 wherein both of said drive means are disposed on the same side of said support member.

16. Apparatus according to any of claims 11 to 15 wherein said second extensible fluid motors are disposed in parallel relation.

17. Apparatus according to any of claims 11 to 16 wherein said support member has offset to one side thereof on the side facing said housing a mounting plate for said housing, said support members lying in a general plane, said lever arm in part lying in said general plane, and said second extensible fluid motor generally overlying said support member.

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FIG. 1

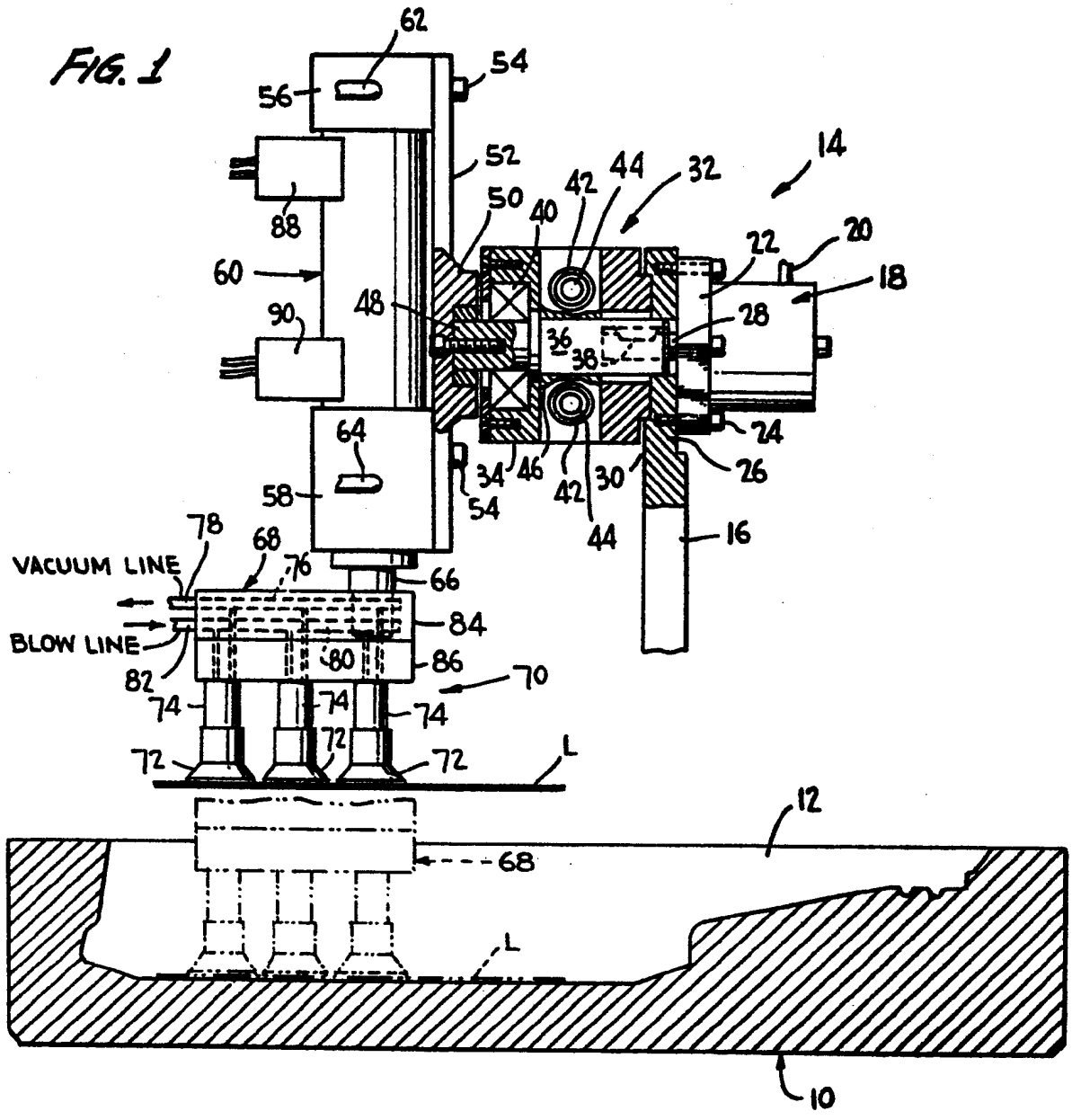

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FIG. 2

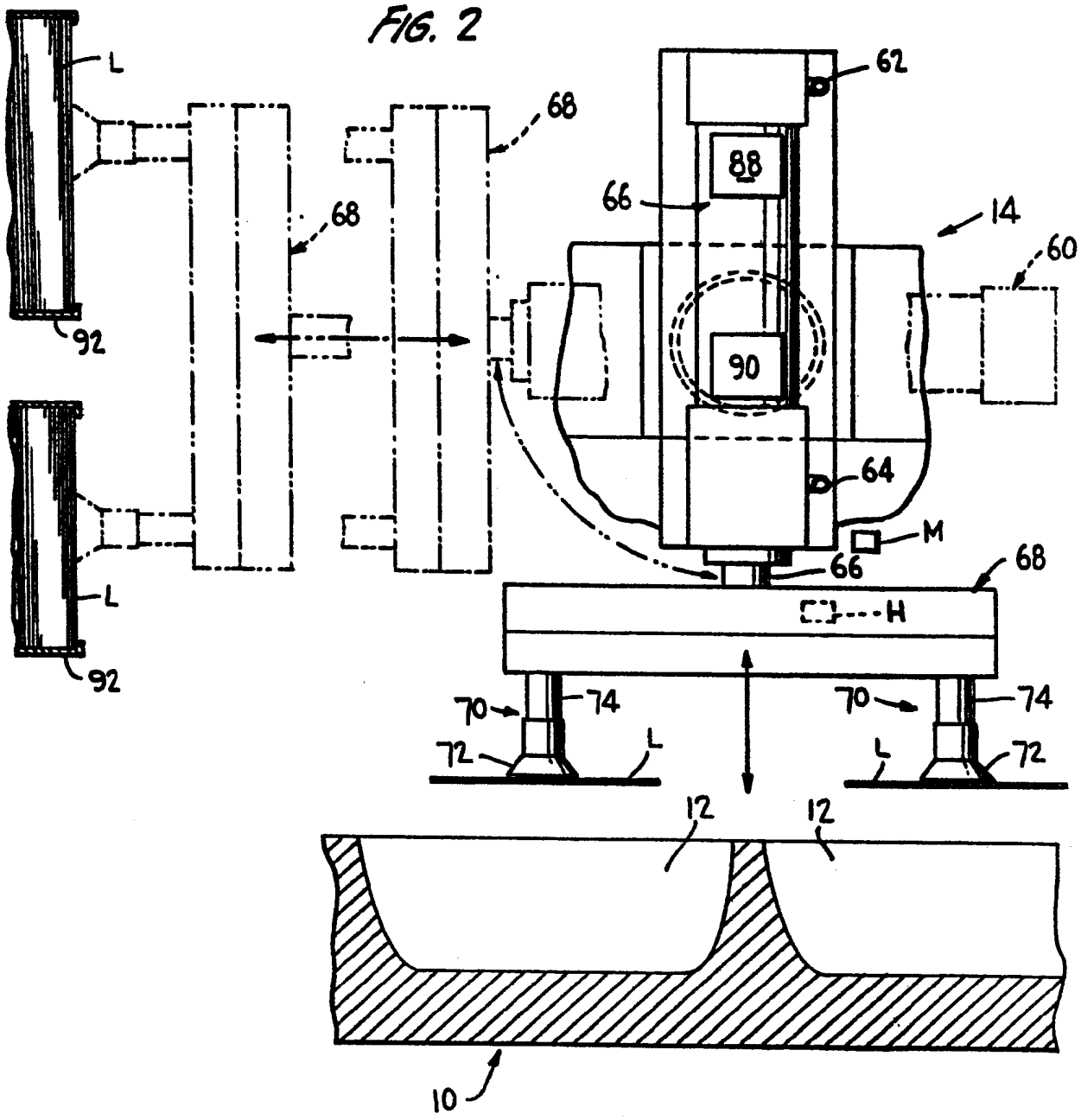

FIG. 3A

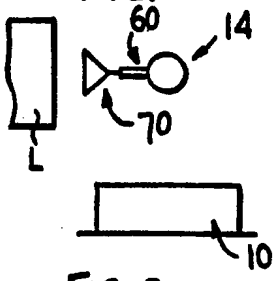

FIG. 3B

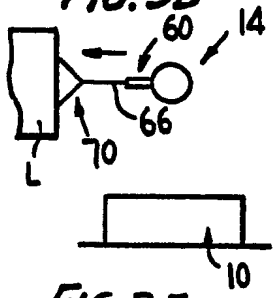

FIG. 3C

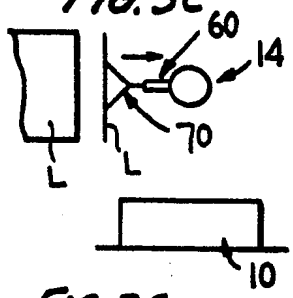

FIG. 3D

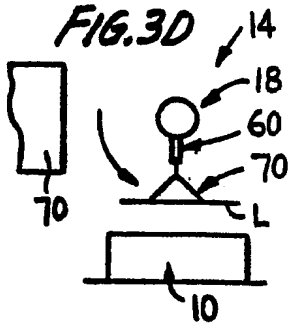

FIG. 3E

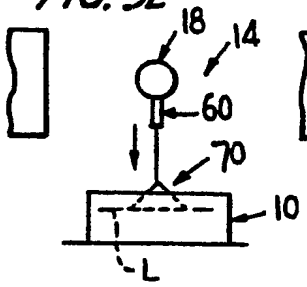

FIG. 3F

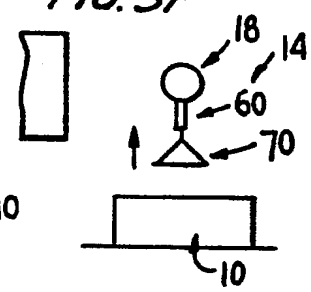

FIG. 3G

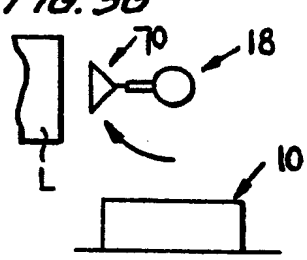

FIG. 4

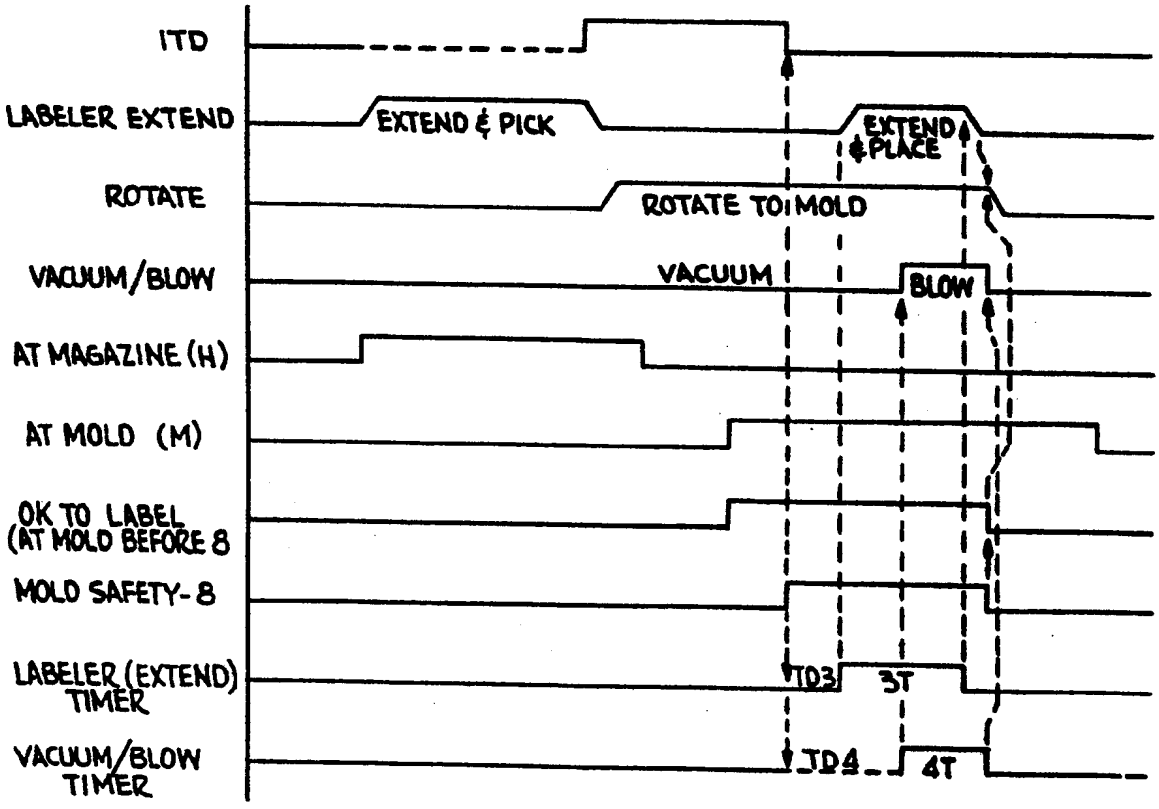

FIG. 6

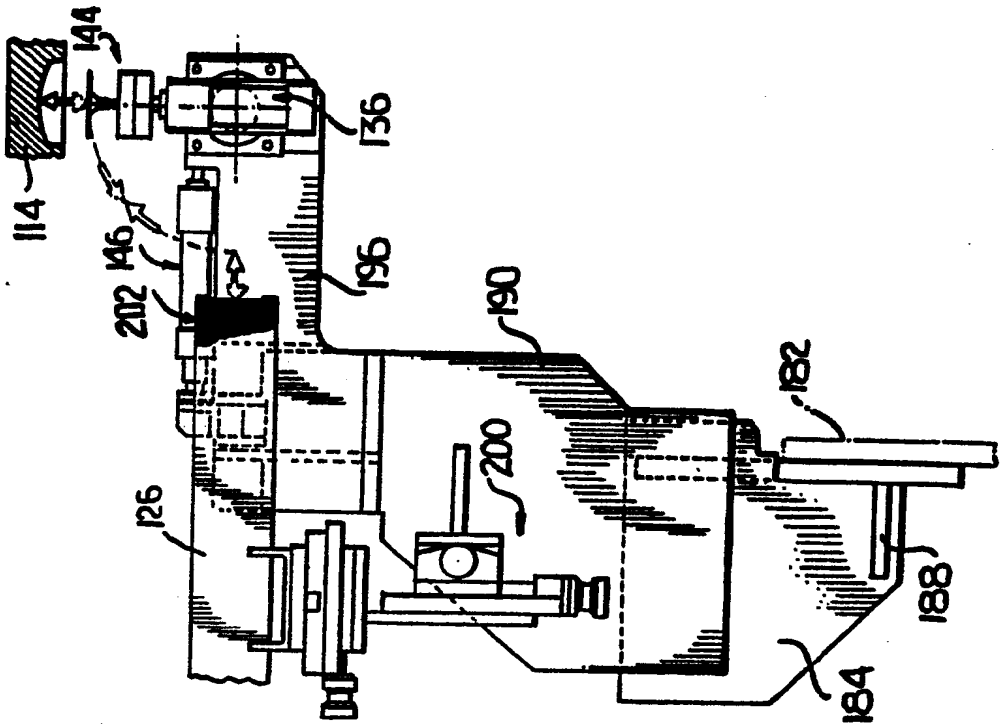

FIG. 5

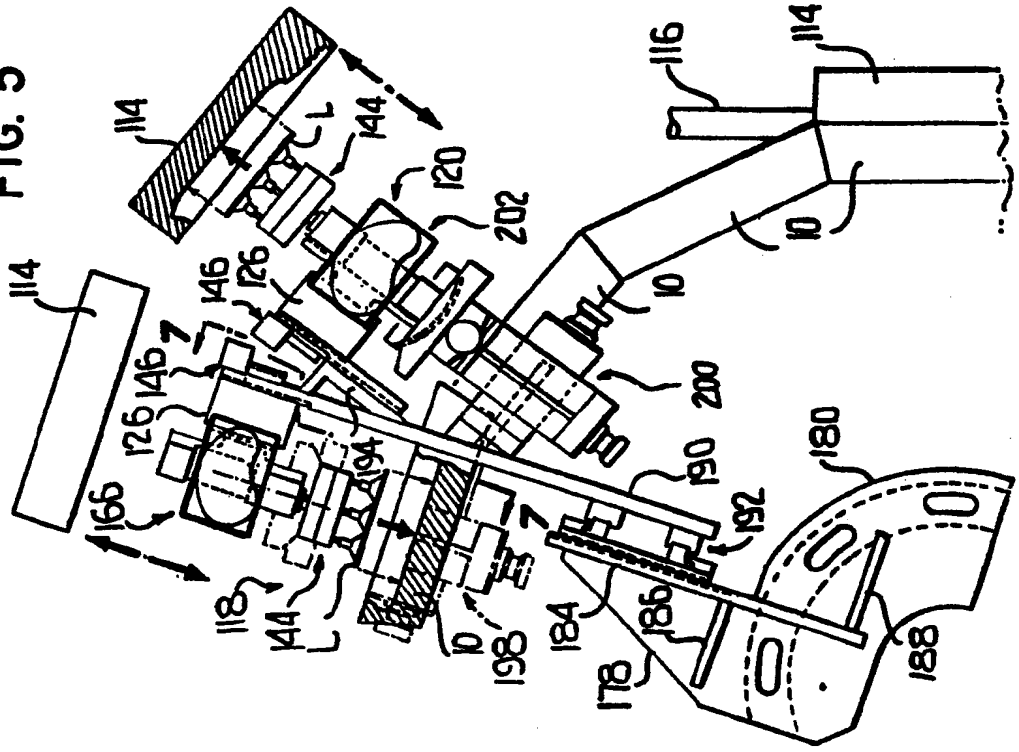

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FIG. 7

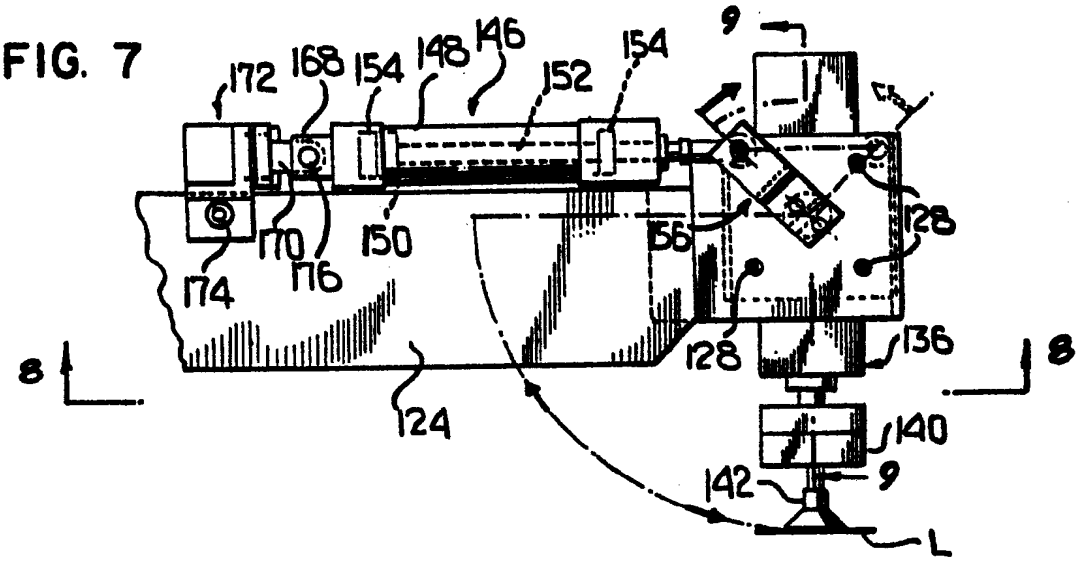
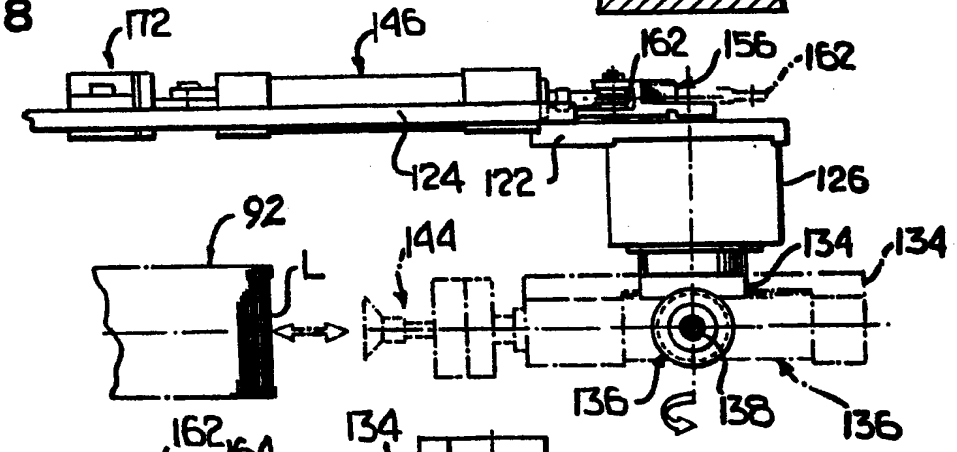


FIG. 8



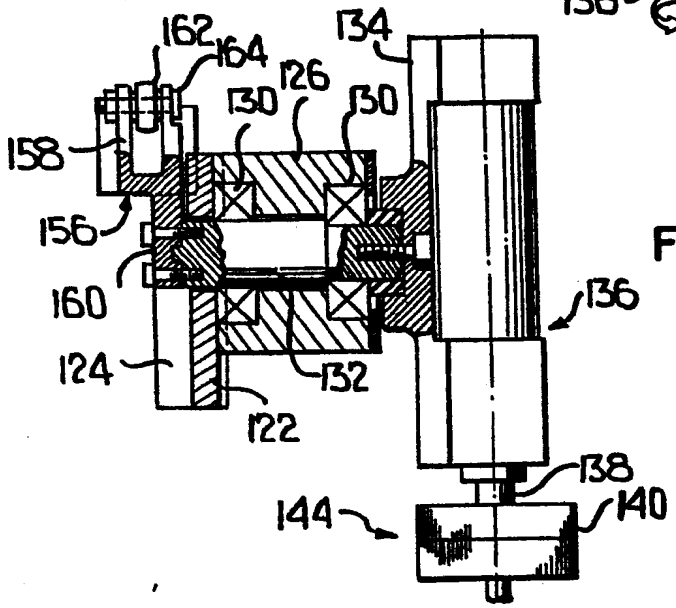


FIG. 9

European Patent Office

EUROPEAN SEARCH REPORT

Application number

EP 84304540.2

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int Cl 4)
A	US - A - 4 368 018 (REES) * Totality * --	1	B 29 C 49/24
D,A	US - A - 4 359 314 (HELLMER) * Totality * --	1	
D,A	US - A - 4 355 967 (HELLMER) * Totality * --	1	
A	DE - B - 1 778 732 (SOMMER) * Totality * ----		

TECHNICAL FIELDS SEARCHED (Int Cl.4)

B 29 C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
VIENNA	21-12-1984	REININGER

CATEGORY OF CITED DOCUMENTS

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